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ABSTRACT

An investigation examined teachers' perceptions of nonverbal behaviors of their students within a developmental paradigm. A questionnaire was sent to 901 elementary and secondary school teachers from a 4-state area. It asked teachers to estimate the percentage of students who engaged in 24 nonverbal classroom behaviors of 4 general types: chronemic (time orientation), classroom environment, turn-taking and conversational regulation, and emotional expression and recognition. Results indicated that (1) children were more alert in the morning than later in the day; (2) children in the early primary grades had a clearer understanding of informal time than formal time, while in the later grades that trend was reversed; (3) students at all grade levels preferred colorful classrooms; (4) older children were more competent in pausing in appropriate places when talking; (5) the percentage of students who clearly communicated their emotions to teachers declined with age; (6) students decreased the expressions of emotions through actions with grade level; (7) students reduced their physical expression of anger as they matured with grade level; and (8) by the end of high school, only half of all students were perceived as being able to clearly express or interpret emotions. (HOD)

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THE ACQUISITION OF NONVERBAL ATTITUDES AND BEHAVIORS IN SCHOOLCHILDREN, GRADES K-12

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ABSTRACT

This study examined teachers' perceptions of nonverbal behaviors of their students in a developmental paradigm. Nine hundred and one teachers from kindergarten through twelfth grade estimated the percentage of students who engaged in twenty-four nonverbal classroom behaviors of four general types. Results indicate significant development differences for all six chronemic variables, two of five classroom environment variables, one of three conversational regulation variables, and three of ten emotional expression and recognition variables. The results demonstrate that some behaviors are acquired prior to school-age, other behaviors are suppressed during the school years, while additional behaviors are learned during the school years.

The development of nonverbal communication in children has recently become an area of interest for communication researchers (Cooper, Friedley, Stewart and Tkachuk, 1980). While most of this research has been conducted on infant and preschool populations, instructional communication researchers have begun to focus on the behavior of school-aged children in the classroom context (Andersen, Andersen, Wendt and Murphy, 1981). This is an important beginning since most research on nonverbal communication in the classroom has examined the behavior of teachers rather than students (Andersen, 1979; Bassett & Smythe, 1979; Hurt, Scott & McCroskey, 1978).

Recent research articles have recognized the centrality of nonverbal communication in all communication contexts and particularly in classroom communication. Indeed, several scholars have argued that American education has been dominated by verbal/left-hemispheric brain processes and has largely ignored nonverbal/right-hemispheric brain processes (Bogen, 1977; Samples, 1975). Andersen, Garrison and Andersen (1979) suggested that a priority for researchers should be the examination of effective classroom strategies which focus on the nonverbal/right-brain hemisphere system exclusively and in conjunction with the verbal/left-brain hemisphere system. Nonverbal classroom communication is not only an important research area independently, it is also important as it relates to verbal communication. Burgoon and Saine (1978) showed that nonverbal and verbal communication are intricately related to one another in that nonverbal communication can provide redundancy, can substitute for verbal communication, can complement verbal messages, can emphasize verbal utterances, or can act to contradict verbal meanings altogether. A complete examination of verbal processes in the classroom

should not ignore nonverbal processes.

The purpose of the present study is to extend the findings of Andersen, Andersen, Wendt and Murphy (1981) to additional codes and functions of nonverbal communication. The Andersen, et al. (1981) study examined 42 variables across six common nonverbal communication codes including proxemics, haptics, oculesics, kinesics, vocalics and physical appearance. The present study is a methodological replication of the Andersen, et al. (1981) study but extends their findings to four additional areas of nonverbal attitudes and behaviors. The first two sections examine the development of school children's attitudes and behaviors regarding chronemics, the study of time orientation and the uses of time, and classroom environment, including color, temperature and furniture. The final two sections investigate the interrelationships between verbal and nonverbal classroom communication by examining the development of nonverbal turn-taking or conversational regulation skills and the development of verbal and nonverbal emotional expression and recognition in school children.

Chronemic Development

The study of time orientation and the meaning associated with uses of time comprise chronemics. While a number of studies have examined the development of time perception in children, few studies have looked at how children conceptualize and use time in a classroom context. One study (Lyons, 1978) examined the awareness of sixth grade students regarding waiting time in the classroom and found these students understood instances when waiting was required. It is not known at what age understanding of waiting time first occurs. Montroy, McManis and Bill (1971) found that understanding time concepts increased steadily with mental age.

A series of studies have consistently shown that children's understanding of time duration increases with age. Levin (1977), in a study of nursery

school children, first graders and third graders, found that ability to judge the duration of syncronous events increased with age. Levin also found that some types of time problems were more easily solved than others. Specifically, estimates of the duration of still objects were easiest, whereas problems that required estimates of speed and distance complicated the task and impeded performance. Levin, Israeli and Darom (1978) also found that accuracy in judging duration increased from first to third grade. Similarly, Rozek, Wissman and Gorman (1977) reported that accuracy of estimates of story duration and reproduction of sixty-second intervals increased between four and nine years of age. Esses (1979), in a study of both time duration and routines, found that between kindergarten and adolescence accuracy of duration estimates improved significantly. Finally, Luce (1971) reported Piagetian studies which indicate that children understand the concept of age but do not understand the order of events. A typical seven year-old is discussed who knows his eight year-old friend is older, but does not know that his friend was born first (pp. 13-14).

Considerable evidence indicates that young children actually perceive time as passing more slowly. Luce (1971) reported a series of Piagetian studies which suggest that until age eight time is generally experienced as an expanded construct and is perceived to pass more slowly. Since people with high temperatures report time passes more slowly, and since children have higher body temperature, temperature may be the reason why children experience an expanded sense of time (Luce, 1971, p. 16; Whaley & Wong, 1979). Another explanation for the fact that children perceive time passing slowly is that they function at a different physiological rate. Young people hear higher sounds than older people, suggesting that their brain responses are faster. Faster brain responses cause a perception of slow time passage (Luce, 1971, p.14).

Several studies indicate that biorhythms may be responsible for children's peaks and valleys in classroom activity. Many teachers have told the present authors that some children are active in the morning while others are most active in the afternoon. Luce (1971, p. 111) suggested that children, like adults, have variable hormone and metabolic levels which predispose them to be either "owls" or "larks." Some children awaken slowly and do not become active until midday while others experience early activity peaks. Moreover, one study indicated that some children have rhythmic body cycles while others show no apparent regular rhythms (Thomas, Chess & Birch, 1970). Hayes and Cobb (1979) found a 91-minute cycle of sociability in adolescents and adults. This cycle produced systematic variations in all activity, particularly in social interactions. This evidence suggests that activity in general and communication behavior in particular are highly variable in each individual and follow regular biorhythms. Whether children manifest developmental differences in social biorhythms is not known.

Developmental patterns of chronemic behavior in school children need to be identified including: (1) Does the ability to understand time concepts increase linearly with age? (2) Do students in particular grade levels experience time to pass slowly? (3) Do children at particular grade levels show either morning or midday alertness peaks? These questions led to the first general research question:

Q_1 How do chronemic behaviors of school children vary across grades K - 12?

Classroom Environment

In the last decade, a number of studies have focused on classroom environmental variables and their role in the learning process. Knapp

(1978, pp. 83-84) maintained that a long list of classroom environmental problems can be provided by teachers and students including problems with lighting, acoustics, temperature, noises, unmovable seats, and poor color schemes. The present study examines developmental changes in student behaviors and preferences for temperature, color, and flexibility in classroom seating.

Classroom temperature. Several studies of childhood physiology report a steady decline in body temperature and metabolic rate from infancy to maturity (Luce, 1971, p. 17; Whaley & Wong, 1977, p. 61). Additionally it is reported that younger children are more susceptible to and influenced by environmental temperatures than adolescents (Kozier & Erb, 1979, p. 242; Whaley & Wong, 1979, p. 61). High classroom temperatures have been reported by many teachers to produce lethargy in students, particularly in the early grades. In one study of nine year-olds Holmberg and Wyon (1972) reported significant behavior changes in classrooms of 20, 27, 30 degrees centigrade. Presently, little systematic developmental data exist regarding preference for or behavior change due to temperature variations.

Classroom color. In his book on nonverbal communication in the classroom, Thompson (1973) argued that different colors have substantial effects on student behavior. Additionally, he maintained that school children are part of a color-liberated generation who have grown up with colorful posters, color television, colorful clothing, and flashing lights (Thompson, 1973, p. 58). Indeed, classrooms with drab color schemes may have substantial problems competing with these attention-grabbing stimuli.

For many years it has been known that children like warm and exciting (e.g. red, yellow, orange) colors. Ask any early elementary school teacher and he/she will tell you that children prefer bright toys, rooms, and clothing.

Thompson (1973, p. 69) maintained that kindergarten children enter school with a built-in preference for red, yellow, blue or orange. Mehrabian (1976) reported that installation of red carpeting in an elementary school library increased student use and liking for the library. Indeed, school consultants have recommended bright stimulating colors for elementary classrooms because these colors increase participation and expression. Consultants have suggested the use of green, blue and gray to improve concentration in secondary classrooms.

Several studies have reported developmental shifts in color preferences with increases in age. Thompson (1973, p. 69) asserted that most authorities agree that between age 3 and 15 children's preferences shift from warm to cool colors. Busniakova (1977) reported developmental changes in color preferences between ages 4 through 20 with younger children preferring rich, chromatic colors, while older children preferred pastel shades. The present study is an attempt to extend these findings to classroom color preference in school children.

Flexible seating. For years scholars and writers have recommended movable classroom seating as generally beneficial. Thompson (1973, p. 37) suggested that some teachers recognize the inhibiting effect of static rows of chairs and desks and rearrange desks to facilitate openness and participation. Hurt, Scott and McCroskey (1978, pp. 95-98) recommended movable seats because they can be placed in a variety of arrangements. Alternative seating arrangements provide flexibility for various types of classrooms, students, and tasks. Andersen and Andersen (1982) suggested that teachers should use movable desks and arrange them to reduce visual barriers and increase student visability in order to increase interaction.

Unfortunately, most teachers still prefer traditional, fixed, straight-row

seating arrangements. Teachers feel in more control and better able to evaluate and supervise students in a traditional "normal" classroom situation (Insel & Lindgrin, 1978, p. 12). Sommer (1974, p. 81) reported that by junior high school, students prefer traditional rows and frequently move their chairs back to traditional arrangements from random or flexible patterns.

Do children of various ages differ in their preferences for movable seats? Insel and Lindgrin (1978, p. 70) reported studies which suggest that preschool children prefer the stability of furniture arrangements and seating positions. Likewise, they reported several studies which show that environmental stability and orderliness may help to promote children's mental development. In a study by Beals (1972) it was found that fifth and sixth grade children reacted more positively to open-space classrooms compared to traditional classrooms. The open, flexible classrooms were described by the children as more student-centered, helpful, interesting, and less restrictive. Finally, Crowhurst and Suzanne (1978) reported that seventh and eighth-graders preferred irregular, geometrical and multilevel environments as opposed to conservative structures.

The present study examines classroom environment effects on the behavior and preference of school children including: (1) Are physiological responses to and preferences for temperature developmentally different? (2) Do children at various grade levels manifest different color preferences? (3) Do children of various grade levels differ in their preference for flexible seating arrangements? These questions led to our second general research question:

Q_2 How do classroom environmental preferences and reactions vary across grades K - 12?

Nonverbal Turn-taking and Conversational Cues

An important function of nonverbal communication is the ability to employ

nonverbal cues to regulate and control conversational behaviors. Though these cues are almost exclusively nonverbal in nature, they are essential in developing verbal conversational skills. Knapp (1978, p. 218) maintained, "Without much awareness for what we are doing, we use body movements, vocalizations, and some verbal behavior which often seems to accomplish this turn-taking with surprising efficiency." Indeed, Duncan and Fiske (1977) reported considerable research which indicates that nonverbal cues play an important part in regulation of exchanges between speakers and listeners. Examination of nonverbal conversational and turn-taking cues is particularly important to study in a developmental paradigm because their development is essential to the production of competent communication behavior. Thus, the present study examines appropriate conversational pauses, effective listener responses, and conversational turn-switching cues.

Conversational pauses. Evidently the ability to utilize pauses effectively begins very early in childhood. In her summary of nonverbal development, Wood (1981, pp. 202-203) maintained that by the time children reach school age their speech includes filled and unfilled pauses that are almost adult-like. Furthermore, their pausal patterns are well set and undergo fewer subsequent changes. Indeed, Levin, Silverman and Ford (1967) found no significant difference in the pausal patterns of children between 5 and 12 years of age. Welkowitz, Cariff and Feldstein (1976) found that matching of a conversational partner's switch-pauses was apparent by age 5½. Matching of conversational duration pauses showed a developmental improvement between 5½ and 6½ years of age. Sabin, Clemmer, O'Connell and Kowal (1979) found that between kindergarten and second grade significant decreases in the length of unfilled pauses occurred. Additionally, they found that the length of unfilled pauses stabilizes around the second grade and remains highly stable throughout

adolescence and adulthood. However, frequency of unfilled pauses shows significant declines between kindergarten and second grade and between sixth and eighth grade but no significant changes from second to sixth grade or from eighth grade through adulthood. The present study examines perceptions of appropriate pausing from kindergarten through high school.

Listener responses. Competent conversational behavior includes back-channeling or providing listener responses to punctuate and provide listener feedback to a conversational partner. These responses include cues such as nodding, vocal utterances, short verbal phrases, maintenance of appropriate eye contact, appropriate facial expressions, and gestures. Dittman (1972), in a study of first, third, and fifth graders, found that listener responses were absent except under the "strongest social pull" by speakers. Some evidence of marginally effective listener responses appeared by the fifth grade. Knapp (1978, p. 65) reported subsequent studies indicating a dramatic increase in effective listener responses by the eighth grade. Rosenfeld, Shea and Greenbaum (1975) examined children's ability to recognize positive and negative listener responses and found increases in recognition ability between third and fifth grade. The present study examines the continuous development of listener responses in school children between kindergarten and high school.

Conversational turn-switching. Effective communicators skillfully coordinate exchanges of conversational turns. Failure to master turn-switching results in either frequent interruptions and talkovers or uncomfortable conversational silences or both. Research on infants (Beebe, Stern & Jaffe, 1979) reported intricate early interaction patterns between mothers and infants prior to four months of age. Though these rhythmic patterns are primarily kinesic in nature, they are viewed as important precursors of verbal

conversational patterning. Studies of preschool children indicate that turn-taking skills are well-established by age four. DeLong (1977) reported that four to five year-old nursery school children rarely interrupt one another and emit appropriate turn-taking signals. Similarly, Welkowitz, et al. (1976) found conversational turn-switching pauses are learned by age $5\frac{1}{2}$. Conversely, Smith (1977), in a study of seven age groups ranging from 5 to 20 years of age, found that the mean number of conversational talkovers, in group settings, decreased with age. The present study examines conversational turn-switching from kindergarten through high school.

In this study several questions regarding conversational and turn-taking cues are examined including: (1) Do developmental differences exist in the appropriateness of conversational pauses among school children? (2) Does the ability to provide appropriate listener responses differ developmentally among school children? (3) Does the ability to effectively recognize nonverbal conversational turn-taking cues increase with age? These specific questions led to the third general research question:

Q_3 How do turn-taking and conversational cues vary among school children grades K - 12?

Nonverbal Emotional Expression and Recognition

One of the most important skills a child acquires during development is the ability to accurately send and receive expressions of emotion. A child must first learn how to represent emotions and then to discriminate among situations, relationships, and types of cues that successfully communicate such emotions. As subsequent studies will show, the school years are more noteworthy for the suppression rather than the production of some emotional displays. Similarly, the competent communicator must learn to recognize

emotional displays, even subtle ones, in the communication behavior of others. This section provides a review of the literature on the development of expression and recognition of emotional displays.

Production of nonverbal emotional expressions. In a study of nursery school, second grade and fifth grade children, Hamilton (1973) found small increases in accurate production of facial expression with age. Buck (1975) found that young children utilized a substantial quantity of emotional expression. He argued that children, but particularly boys, suppress emotional expression as they mature, resulting in substantial internalization of emotion among adults. In further support of the notion of suppression accompanying socialization, Buck (1977) found a negative correlation between emotional sending ability and age for children 4 to 6 years old, with boys in particular concealing their responses to emotions. Burgoon and Saine (1978, p. 200), in their summary of research, concluded that by the time a child reaches kindergarten he or she has a well-developed repertoire of emotional expressions. Thus, evidence indicates preschool children are both learning the meaning and use of emotional expression, and are simultaneously being socialized to suppress nonverbal emotional displays depending on role and context.

Studies of young school children seem to show increases in the production of nonverbal emotional expression. Odum and Leonard (1972), in a study of both kindergarten and fifth grade children, found some increases in production of facial expressions of emotions, but less than the increases in the perception and discrimination of facial expressions. Moyer (1975) found increases in the ability of children to produce posed facial expressions of emotion from kindergarten to third grade. Conversely, Koburger (1978) found no developmental increases in the ability to encode nonverbal emotional

expressions in the facial or vocal channels, in children ages 6, 9 and 13. Saarni (1979) reported that ten year-olds were more likely to employ display rules and less likely to use spontaneous expressions than were six or eight year-olds. These inconsistent findings may be the result of the previously mentioned conflict between learning to use emotional expressions and the simultaneous learning of display rules that prohibit the free nonverbal expression of emotions in certain situations.

In a study of children age 5 to 12, Alexander, Stoyle, Roberge and Leaverton (1971) found the amount of verbalization of emotional experience increased with age. This trend was particularly true for positively labeled expressions and most pronounced between ages 11 and 12. Similarly, Farmer (1967) reported that the quantity of children's verbal descriptions of emotions increased with age, particularly between ages 10 and 12. These findings suggest that verbal labeling of emotions shows a continuous developmental trend that is largest at ages 10 through 12.

Production of nonverbal expressions of anger. One of the most interesting types of emotional expressions is the anger display. Not only is it one of the most common expressions among young children, it is also one of the most socially undesirable expressions and likely to be suppressed through socialization. Charlesworth and Kreutzer (1973, p. 132), in their summary of several studies on expressions of anger, reported development differences in the production of anger displays. Specifically, they maintained that during the nursery school years the instances of screaming, crying and calling for help decrease with age while verbalization during conflict shows corresponding increases with age. Explosive outbursts including kicking, stamping, jumping up and down, striking, making the body limp, refusing to move, struggling, running for help, and negative facial expressions, decrease

with age. More recent studies (Brannigan & Humphries, 1969) indicated that many displays of anger and defensiveness are present in nursery school children but disappear shortly thereafter. For example, the "beating-posture", a common preschool signal of balance between aggression and escape, disappears almost entirely after age six. In a study of posed facial expressions, Buck (1975) found anger to be the most difficult emotion for four to six year-olds to portray. He suggested this finding is attributable to the socialization process that inhibits the expression of undesirable emotions. Moyer (1975) found that between kindergarten and third grade there was a consistent improvement in the ability to both recognize and produce anger expressions. The majority of these studies indicated expressions of anger decline with age as a result of childhood socialization. The one exception (Moyer, 1975) was a study of posed facial expressions that found increases in ability to produce anger expressions with age. This indicates that the ability to produce or simulate anger increases with age, but because of socialization the production of spontaneous displays of anger actually decreases with age.

Recognition and interpretation of nonverbal emotional expression. From a theoretical standpoint, one would assume that the ability to encode emotions may not be related to the ability to decode emotional messages. Numerous communication books and articles make a distinction between source and receiver roles, speaking and listening, etc. In the area of nonverbal communication, the ability to recognize facial expressions has been empirically demonstrated to be independent from the capacity to portray posed facial expressions of affect (Koburger, 1978; Lanzetta & Kleck, 1970; Moyer, 1975; Odom & Lemond, 1972). Thus, examination of the development of emotional recognition ability needs to be investigated separately from the development of emotional production ability.

The ability to recognize emotional affect in facial expression for eight

age groups was investigated by Honkavaara (1961) in a series of three studies. She found that the ability to correctly identify facial expressions of affect dramatically increased across the first four age groups (3 through 10 years old). Smaller, less consistent increases in recognition occurred for the age groups ten through adult. In an early study of questionable methodological sufficiency, Gates (1923) maintained that facial expressions of laughter were understood by age three, pain by more than half of all six year-olds, anger by age seven, fear by age ten, surprise by age eleven, and scorn by 43 percent of eleven year olds. In a study of nursery school, second grade and fifth grade children, Hamilton (1973) found accuracy in recognizing facial expressions of emotion improved with age. In a study of six universal facial expressions Zabel (1979) reported increases in the ability to recognize emotions in facial expressions between elementary school students and junior high school students. Odom and Lemond (1972) found significant increases in the ability of elementary school children to discriminate among facial expressions between kindergarten and fifth grade. A study by Peterson, Danner and Flavell (1972) examined the ability of four and seven year-olds to reformulate initial messages based on verbal and nonverbal feedback that communicated noncomprehension. They found that both four and seven year-olds could successfully reformulate messages if given verbal requests but failed to reformulate messages if provided with only nonverbal facial expressions of listener noncomprehension.

In a study of children's ability to identify the meaning of nonverbal vocal expressions, Dimitrovsky (1964) reported that between ages 5 and 12 there was a gradual but steady increase in accuracy scores. Similarly, Koburger (1978) found developmental increases in the ability to decode both facial and vocal messages of emotion among children ages 6, 9 and 13. In a

cross-cultural study of children from New Guinea viewing facial expressions of Americans, Ekman and Friesen (1971) reported no significant developmental trends in correctly matching facial expression with emotional labels for children age 7 to 15. DePaulo and Rosenthal (1979) administered their famed Profile of Nonverbal Sensitivity to persons aged 8 to 33 and found skill at decoding nonverbal cues improved with age. Most studies in the area of recognition of nonverbal communication indicate that such ability improves with age. Bonneau (1975) provided one possible explanation for these findings by reporting that sensory perception improves between 12 and 19 years of age, particularly between age 12 and 15. Mayo and LaFrance (1978) explained the improvement of nonverbal recognition scores is probably a function of both cognitive development and social learning. Cognitively, children learn decentralization, the separation of self from others, and attend more closely to others. Simultaneously, through reinforcement and modeling, children are learning to recognize emotional displays.

The above discussion leads to general research questions including: (1) Does the ability to express emotion both verbally and nonverbally change with age? (2) Does the expression of anger differ developmentally among school children? (3) Does the verbal and nonverbal communication of confusion differ developmentally? (4) Do children of various ages differ in their ability to correctly interpret other's emotions? To answer these questions the fourth and final research question is posed:

Q_4 How does the ability to express and interpret emotional states vary across grades K - 12?

Methods and Procedures

This investigation examined teacher perception of students' chronemic, environmental, turn-taking and emotional displays by asking teachers of various grade levels to report which nonverbal communication behaviors students typically engage in at their grade level.

Subjects

The subjects in this study were 901 elementary and secondary school teachers from a four-state area. The sample consisted of the following number of teachers from each grade: kindergarten, 50; first grade, 89; second grade, 74; third grade, 86; fourth grade, 67; fifth grade, 55; sixth grade, 101; seventh grade, 53; eighth grade, 84; ninth grade, 57; tenth grade, 62; eleventh grade, 36; and twelfth grade, 87. The sample size varied slightly for the analysis of individual nonverbal behaviors, since some teachers omitted an item or two when completing the questionnaire. Of the teachers in this sample who reported their sex, 729 of them were female and 165 were male.

Questionnaire Construction, Dependent and Independent Variables

Teachers were asked to respond to a series of descriptions of nonverbal behaviors and indicate the approximate percentage of students in their grade who engaged in the described behavior. They were instructed to mark 100% if virtually all students engaged in the behavior, 75% if most students engaged in the behavior, 50% if about half engaged in the behavior, 25% if some but not half engaged in the behavior, and 0% if virtually none of their students engaged in the behavior.

The questionnaire consisted of a list of nonverbal behaviors which are the dependent variables in this investigation. The nonverbal behaviors

selected for inclusion were generated by the researchers and based on the general topics reviewed in the literature review. Additional items focusing on nonverbal behaviors that are discussed in communication textbooks or nonverbal behaviors that have been commented on in previous teaching experiences were added to the questionnaire. As the literature review indicated, the development of nonverbal communication ability during the school years is not an extensively researched subject. This study was viewed as exploratory and the major criterion for dependent variables was that the list be extensive and diverse. Each item was treated as a separate dependent variable, since there was no previous theoretical or empirical rationale upon which to base data reduction techniques or to create linear composites. For example, to suggest that all proxemic dependent variables create a linear composite would assume that various proxemic behaviors develop simultaneously, a position for which there is no evidence.

Sixty-four nonverbal behaviors were generated for the questionnaire. Nonverbal variables related to proxemic, haptic, oculesic, kinesic, vocalic and physical appearance have been reported in a previous study (Andersen, Andersen, Wendt and Murphy, 1981) Consistent with this literature review, this study examines the 24 variables related to the chronemic, environmental, turn-taking and emotional expression functions and codes of nonverbal communication.

The independent variable for all analyses was the grade level taught by the teacher. As stated previously, teachers were instructed to report what percentage of their students engaged in each nonverbal behavior. Grade level of the teacher, therefore, served as the developmental marker to view the acquisition and/or cessation of student nonverbal behaviors.

Procedures

The two-page questionnaire was distributed to teachers who were enrolled

in graduate-level continuing education courses. There were approximately 35 teachers per class. No subject identification was requested, so all responses were anonymous. Instructions were included on the questionnaire, and most people completed the questionnaire in 10 to 15 minutes.

Reliability of Instrument

Since each dependent variable was measured by a single-item scale, traditional tests of reliability were impossible. To check for internal consistency, one item on the scale was asked twice. The behavior was what percentage of students avoid overweight children, and it was item 43 and item 58. The correlation between these two items was .93, suggesting very high internal consistency. Two other items (items 15 and 26) were very similar in that one was "will avoid sitting at a desk with other's belongings on it" and the other one was "avoid a seat occupied by another's book or jacket." These items were correlated .76. Another set of items (items 29 and 41) differed only in that one asked "stand closer to you than adults do when talking" and the other asked "sit closer. . . ." These were correlated .66. Finally, two items which read very similarly but actually test different concepts were only correlated .48. They were items 14 and 31, and they were "look at you when they talk" and "look at you when you talk." These several inter-item correlations are pointed out to demonstrate that teachers seem to be responding most consistently to identical items, next most consistently to similar concepts, and less consistently to semantic structures. Items next to each other but not similar in concept were not highly correlated and in fact were often not even related at statistically significant levels. Together this evidence suggests good instrument reliability.

Statistical Analysis

The mean percentage level of students reported to be engaging in each nonverbal behavior at each grade level is reported. The variance in each of the dependent variables explained by grade level was calculated by using both regression analyses and analyses of variance. These procedures yielded R_2 and eta_2 variance estimates. Both analyses were conducted since they yield different information. Linear trend analyses (Kerlinger & Pedhazur, 1973) were also performed to test first whether the relationship had a significant linear component, then to test for significant nonlinear components, and finally to test for curvilinear components. Alpha level for all tests of statistical significance was computed at the .05 level, two-tailed. Power analysis (Cohen, 1977) was also computed. For all comparisons the power for detecting small effects was .45 when using analysis of variance models, and it was .91 when using correlation or regression models. Power was in excess of .995 for detecting medium and large effects for both the regression and ANOVA models.

Results and Interpretation

Pattern of Results

Mean percentages by grade level for each nonverbal behavior are reported in Tables 1-4, together with results from regression analyses and analyses of variance tests. Results for each of the four nonverbal topic areas are reported and interpreted within this section. Before proceeding, however, a discussion of the overall pattern of results and a comment about the nature of nonlinearity and curvilinearity follows.

Overall, linear trend analyses revealed that whenever there was a significant relationship between the dependent variable (an individual nonverbal

behavior) and the independent variable (teacher grade level), there were significant linear and nonlinear components. Although some nonverbal behaviors (e.g. item 53) show virtual continual progression, the progression is not in equal intervals. Thus, the nonlinear component is also significant since linearity assumes equal progression. Curvilinearity was also tested and for the four variables where results indicated a significant curvilinear component, they are reported in this section.

Chronemics

Six chronemic variables were examined in this study (see Table 1). Regression analyses demonstrated all six to have significant linear and non-linear developmental patterns, although analyses of variance failed to find two items (#62 and #65) different among grade levels.

Two items focus on student biorhythms (#23 and #45, Table 1). Results indicated that 11% to 15% of the variance in morning alertness can be attributed to grade level with younger children being more alert early in the morning. In a similar vein, 5% to 7% variance in midday or early afternoon alertness can also be attributed to grade level with more older students being most alert at midday or later. At all grade levels, however, over 60% of the students are perceived to be most alert early in the morning while less than 43% are perceived to be most alert at midday or early afternoon. Although these two items are not the direct opposite of each other, as some students may be perceived to be most alert at neither or both time periods, the two items were negatively correlated at .58.

The results on these two biorhythm items suggest two interesting conclusions. First, children become more owl-like and less lark-like as they age. This may be due to older children staying awake later at night, moving their body cycles to a later period of the day and thus reducing morning alertness.

These data also indicate that at all grade levels more children are alert in the morning than later in the day demonstrating that we are predominantly a morning culture accurately characterized by the "early to bed, early to rise" slogan. Indeed, the early hour at which school begins may contribute to the preponderance of the "lark" culture.

Results for two questions pertaining to the conceptual understanding of formal and informal time indicated a strong developmental progression (items 48 and 53, Table 1). In terms of formal time, 30% to 40% of the variance in understanding what an hour is can be explained by grade level. At kindergarten, fewer than 20% of the students understand what an hour is, but by twelfth grade over 80% understand the concept of an hour. Curvilinear analysis indicated a significant curvilinear component ($F=117.50$, $p<.0001$, $R^2 = 8\%$) with ability leveling off in grades 6 to 8, peaking at grade 11, and declining slightly in grade 12.

Understanding informal time also shows a developmental trend but the effect is less strong. Five to nine percent of the variance in understanding "a little while" (item 48, Table 1) is explained by grade level differences. Percentage-wise, there is a substantial increase in this ability from kindergarten to first grade. From third to tenth grade half of the class understands this concept. Eleventh grade represents a peak in understanding with a decline in twelfth grade, although the curvilinear trend was not significant. As reported in the methods section, eleventh grade teachers were the smallest group sampled in this study with only about half as many eleventh grade teachers represented as compared to other grade levels. This potential sampling bias must be considered before overinterpreting any differences. It is possible, however, that in the last year of high school, students' eagerness to move to another phase of their life produces altered time perceptions.

These results also revealed that children in the early primary grades have a clearer understanding of informal time than formal time while in the later grades that trend is reversed. Based on these findings, teachers interested in maximizing student understanding should use informal time messages in the early primary grades and formal time thereafter.

Younger children perceive time to pass more slowly than older ones although grade level only accounted for 1% of the variance (item 62, Table 1). These findings are consistent with, but less powerful than, other studies discussed in the literature review. Furthermore, analysis of variance failed to indicate significant differences among grade levels suggesting large amounts of within group variance. Based on this data, a developmental difference for this variable would have to be considered very weak or nonexistant, a finding inconsistent with previous research. However, about 50% of students at all grade levels are reported to view time as passing slowly and it may be that in the classroom context about half of the class does perceive time to pass slowly. Furthermore, developmental trends and student attitudes toward school may be operating in opposite directions. Younger children may perceive time to pass slowly due to developmental predispositions or metabolic differences but older children may develop increasingly more negative attitudes toward school and thus perceive school time as passing more slowly.

The final chronemic variable assessed teachers' perceptions of whether or not their students are punctual (item 65, Table 1). The assumption is that punctuality is a behavior indicating time understanding. The regression analysis indicated a significant relationship but it only accounted for 1% variance and the analysis of variance was not significant. Well over half of students at all grade levels were perceived as punctual. The least punctual students (56%) are in kindergarten, eighth, ninth and twelfth grade. It may be that new

environments (kindergarten and ninth grade) produce confusion and less punctuality, while students about to leave an environment (eighth and twelfth grade) may demonstrate less concern about punctuality. These possibilities deserve further research investigation.

Classroom Environment

The two variables dealing with classroom temperature indicated no developmental patterns but the two variables associated with color preference demonstrated significant developmental trends. The question on preference for movable desks showed mixed results (see Table 2).

With regard to classroom temperature, slightly more than half of all elementary and secondary students are reported by their teachers to like it cool (under 70 degrees) in the classroom (item 38, Table 2). Furthermore, about one-third of students at all grade levels get overheated and flushed in school (item 63, Table 2). Neither of these variables indicated significant developmental patterns. Despite evidence indicating children's metabolism and temperature peak in infancy and early childhood and decline thereafter (Luce, 1971; Whaley & Wong, 1971), their smaller body size, lower temperatures in their classrooms or some other factor contributed to a lack of observed developmental difference in temperature reaction in this study.

The two color preference variables revealed significant developmental differences. Younger students are more likely to like a colorful classroom with grade level accounting for 5-8% of the variance (item 61, Table 2). However, over 70% of students at all grade levels prefer colorful classrooms. Younger students also prefer yellow, orange or red as favorite colors with grade level predicting approximately 10% of color preference difference (item 68, Table 2). While approximately two-thirds of kindergarteners and first graders preferred these bright colors, only slightly more than 40% of high

school students preferred them. Thus, persons with input on classroom decoration should recommend colorful classrooms for all grade levels to improve student affect and should advise use of extremely bright colors (yellow, orange, or red) in the early primary grades.

The last classroom environment variable asked if teachers thought their students like movable desks (item 75, Table 2). Regression analysis indicated no significant linear developmental trend but an analysis of variance indicated significant categorical differences accounting for around 3% variance. Furthermore, the curvilinear analysis indicated a significant but very small curvilinear component ($F = 6.48$, $p < .02$, $R^2 = .007$). Kindergarten teachers indicated only 61% of their students preferred movable desks while at all other grades the percentage was approximately 75-80%. The one exception is the ninth grade where only 68% of students are reported as liking movable desks. Although care must be taken not to overinterpret these descriptive percentages, one could speculate that kindergarten and ninth graders are two of the most insecure groups of students due to their entrance into a new educational environment, grade school or high school. It may be that these students have a stronger need for a more stable, predictable environment or a situation that offers less opportunity and pressure for interaction. This possibility deserves further research attention.

Turn-taking and Conversational Regulation

Two of the three nonverbal turn-taking and conversational regulation variables indicated no significant developmental patterns, but the variable addressing pausing in appropriate places was significantly different across grade levels (see Table 3). Between 3% and 5% of the variance in pausing in appropriate places when talking can be explained by grade level with older children being perceived as somewhat more competent in this conversational

skill (item 20, Table 3). In contrast, these data indicate no developmental increase in the percentage of children who provide feedback to a speaker, with about 50% of students at all grade levels demonstrating this skill (item 66, Table 3). Although it is possible that this behavior is stable by school age, another explanation for this finding is that students are simulataneously learning how to backchannel and are learning social conventions which prohibit backchanneling in white Anglo-Saxon society (Scheflen, 1972, p. 53). Additionally, fro two-thirds to three-quarters of students at all grade levels understand a nonverbal signal that it is their turn to talk (item 77, Table 3). Although it is not statistically significant, the data show a large percentage increase in this ability between kindergarten and first grade (63% to 75%). Future research should directly investigate whether or not this may be a real difference with a substantial number of students learning to comprehend this nonverbal signal during kindergarten. Previous literature (e.g. Delong, 1977; Welkowitz, et al., 1976) indicates a majority of children have already acquired most conversational turn-taking skills prior to entering schools. This skill may be learned a little later than other turn-taking skills or a new set of turn-taking rules for the classroom situation may have to be mastered with many students learning these skills during kindergarten.

In general, the data on turn-taking and conversational regulation seem to demonstrate that most students have developed behavioral conversational skills prior to contact with school. This indicates that successful training in conversational ability is the primary responsibility of the parent and home environment. These data also seem to indicate that the school environment provides no additional training for students lacking these skills. Future research should investigate if this is due to a lack of effective curriculum and teaching in our schools or if these skills must be acquired

during a critical developmental period and are very difficult if not impossible to acquire thereafter.

Emotional Expression and Recognition

The data on nonverbal emotional expression and recognition indicated few developmental differences. Of the ten variables addressing this area, only three demonstrated significant developmental differences with an additional variable showing significant categorical differences (see Table 4).

The data indicated that the percentage of students who clearly communicate their emotions to teachers declines with age (item 30, Table 4). Grade level significantly predicted 4% of the variance in this difference with categorical differences accounting for as much as 8% variance. Additionally, a curvilinear regression analysis showed a significant curvilinear component accounting for 3% variance ($F = 25.26$, $p < .0001$). The bottom of the curve when fewest students clearly show their emotions is in early adolescence (grades 7-9) when it is common to suppress and internalize emotional displays and when rapid fluctuations in emotions may prevent clear sending or interpretation of emotional displays. Three-quarters of kindergarteners and nearly two-thirds of early elementary school students clearly express their emotions while only about half of junior high students and more than half of senior high students do so. This data supports the position on suppression and internalization of emotions during the socialization process as discussed in the literature review, but also indicates suppression eases somewhat as students enter adulthood.

Consistent with the developmental emotional suppression position, students were also reported to decrease the expression of emotions through actions (item 69, Table 4) with grade level accounting for 5-6% variance. Students also reduce their physical expression of anger (item 44, Table 4) as they mature with grade level predicting 2-4% variance in this behavior. Verbal expression

of anger (item 52, Table 4) failed to indicate any significant linear patterns but the analysis of variance was significant, indicating categorical differences predicting 3% of the emotional display. It is interesting to note that the highest percentages for the verbal display of anger are for kindergarten and eighth graders with eleventh, twelfth and sixth graders close behind. One potential explanation for these findings might be that once students have learned to suppress verbal displays of anger, the emotional display emerges most often in those contexts where individuals feel most powerful and confident (sixth grade when there is a junior high, eighth grade when grade school is K-8, and the last two years of high school).

Although the clear expression of emotion declines developmentally as indicated above, teachers failed to perceive developmental differences in the simple nonverbal or verbal expression of emotions (items 17 and 71, Table 4). For the nonverbal expression variable, a small but statistically significant curvilinear component was observed ($F = 4.53$, $p < .04$, $R^2 = .005$) with several fluctuations throughout grade levels. About two-thirds of students at all grade levels engage in nonverbal emotional display and about half of students at all grade levels engage in verbal emotional display. Similarly, the verbal and nonverbal expression of confusion showed no developmental trends (items 18 and 73, Table 4). When confused, about 50% of students at all grade levels indicated it nonverbally and slightly more than 50% indicated it verbally. When students are excited, teachers also perceived more reliance on verbal rather than nonverbal messages with about two-thirds of all students being perceived as more likely to use verbal over nonverbal expressions (item 39, Table 4). No significant developmental trend was indicated.

The ability to understand and correctly interpret others' emotional expressions showed no developmental differences by grade level (item 70,

Table 4). Slightly more than 50% of students at all grade levels are able to correctly interpret others' emotional expressions.

In general, the pattern in this data for the emotional display variables reveals relatively little developmental change in emotional expression or capabilities. It is understandable that the school environment would have little impact on emotional displays since these actions are not part of the overt curriculum of the school. It is interesting, however, to note that by the end of high school only half of all students are perceived as being able to clearly express or interpret emotions. Unless it is impossible to teach emotional expression and interpretation, schools should consider improvements in the teaching of effective sending and receiving skills in their quest to produce competent communicators.

Summary

These data suggest some important trends in the development of nonverbal communication behaviors. These results provide a beginning for the study of the development of nonverbal competence. They also provide a great deal of information about how experienced teachers perceive students at various grade levels. A serious overinterpretation of these findings, however, would be to suggest that teacher perception is a substitute for objectively observed and coded data. Direct classroom observation is the next step and these findings suggest areas where classroom observation may be most fruitful.

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Table 1

Means, Regression Analyses and
Analyses of Variance for Chronemic Variables

Item	What Percent of Students:	Mean Percent for Each Grade													Regression Analysis			Analysis of Variance		
		K	1	2	3	4	5	6	7	8	9	10	11	12	F	P	R^2	F	P	Eta^2
23	are most alert early in the morning	76	88	83	88	80	74	72	70	66	61	64	61	67	110.87	.0001	.11	12.95	.0001	.15
45	are most alert at midday or early afternoon	34	23	26	23	22	25	34	31	39	38	38	42	38	44.44	.0001	.05	5.82	.0001	.07
48	understand what "a little while" is	34	46	41	54	47	57	58	57	53	54	54	75	63	50.27	.0001	.05	6.86	.0001	.09
53	understand what an hour is	18	31	47	65	68	73	77	77	77	79	82	88	82	376.32	.0001	.30	49.13	.0001	.40
62	perceive time to pass slowly	45	52	48	51	54	55	57	58	57	57	55	63	55	11.87	.0006	.01	1.69	NSD	---
65	are always punctual	56	63	62	65	62	59	63	56	56	56	61	59	56	5.25	.02	.01	1.52	NSD	---

Table 2

Means, Regression Analyses and
Analyses of Variance for Classroom Environment Variables

Item	What Percent of Students:	Mean Percent for Each Grade													Regression Analysis			Analysis of Variance		
		K	1	2	3	4	5	6	7	8	9	10	11	12	F	P	R^2	F	P	Eta^2
38	like it cool in class (under 70°)	59	56	51	58	58	63	62	58	61	55	62	58	61	3.17	NSD	---	1.04	NSD	---
61	like a colorful classroom	93	89	87	91	87	84	88	73	81	76	80	79	80	45.73	.0001	.03	6.25	.0001	.06
63	get overheated (flushed) in school	39	36	34	38	32	37	35	39	39	39	31	41	35	.06	NSD	---	.90	NSD	---
68	prefer yellow, orange, or red as favorite colors	67	63	58	56	59	57	56	53	53	41	44	44	45	90.12	.0001	.10	8.92	.0001	.11
75	like movable desks	61	75	79	79	83	74	79	74	75	68	76	74	74	.22	NSD	---	2.53	.003	.03

Table 3

Means, Regression Analyses and
Analyses of Variance for Turn-taking and Conversation Regulation

Item	What Percent of Students:	Mean Percent for Each Grade													Regression Analysis			Analysis of Variance		
		K	1	2	3	4	5	6	7	8	9	10	11	12	F	P	R^2	F	P	Eta^2
20	pause in appropriate place when talking	41	49	47	57	51	49	54	55	53	52	55	64	60	25.35	.0001	.03	3.78	.0001	.05
66	provide feedback such as nodding when you talk	49	51	46	54	51	51	48	47	51	46	49	47	55	.05	NSD	---	1.07	NSD	---
77	understand a nonverbal signal that it is their turn to talk	63	75	70	76	74	72	73	68	70	68	75	75	71	.07	NSD	---		NSD	---

Table 4

Means, Regression Analyses and
Analyses of Variance for Emotional Expression and Recognition

Item	What Percent of Students:	Mean Percent for Each Grade													Regression Analysis			Analysis of Variance		
		K	1	2	3	4	5	6	7	8	9	10	11	12	F	P	R^2	F	P	Eta^2
17	express their emotions non-verbally	73	67	59	64	65	61	61	66	66	63	65	69	65	.03	NSD	---	1.22	NSD	---
18	communicate their confusion verbally	59	63	58	60	57	57	59	61	55	54	60	61	60	.59	NSD	---	.84	NSD	---
30	clearly communicate their emotions to you	74	65	62	61	59	57	58	48	52	48	54	52	59	39.52	.0001	.04	6.62	.0001	.08
39	are likely to use verbal rather than nonverbal expression when excited	60	72	69	69	68	72	73	67	70	65	70	73	67	.06	NSD	---	1.66	NSD	---
44	express anger physically	61	51	44	44	49	46	47	46	48	47	37	39	41	17.01	.0001	.02	3.27	.0001	.04
52	express anger verbally	62	53	55	56	55	49	58	53	62	52	50	58	58	.05	NSD	---	1.94	.03	.03
69	express emotions through actions	76	70	65	67	65	61	61	62	64	58	55	60	55	47.27	.0001	.05	5.00	.0001	.06
70	correctly interpret others' emotional expressions	54	55	50	59	53	54	51	51	54	51	56	63	55	.68	NSD	---	1.65	NSD	---
71	clearly express emotions verbally	52	51	49	51	52	47	50	52	54	47	51	59	55	3.26	NSD	---	1.31	NSD	---
73	communicate their confusion nonverbally	55	48	41	51	48	52	51	49	53	49	49	52	54	2.88	NSD	---	1.64	NSD	---